



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/028,860	12/19/2001	Paul B. Koeneman	42390.P12041	4678

7590 05/19/2004

Charles K. Young  
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP  
Seventh Floor  
12400 Wilshire Boulevard  
Los Angeles, CA 90025-1026

EXAMINER

ALI, MOHAMMAD M

ART UNIT	PAPER NUMBER
----------	--------------

3744

DATE MAILED: 05/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/028,860	<b>Applicant(s)</b> KOENEMAN ET AL.	
	<b>Examiner</b> Mohammad M Ali	<b>Art Unit</b> 3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 11 is/are allowed.
- 6) ☒ Claim(s) 1-9, 12-20, 22-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "pump located inside of the integrated circuit" for claim 14 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 6-9, 12- 20 and 22-24, 26-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujisaki et al. (5,763,950). Fujisaki et al. disclose a integrated circuit chips/package comprising an integrated circuit die having an active surface 11, and a cooling fluid /coolant 235 directly contact and move across the active surface 11, substrate 12, solder bumps 13, heat sink 23, interposer, internal pump/fan 133, and external pump 197 for flowing cooling fluid in the circuit. See Fig. 1, 20, 28 and 37

Claims 4, 22- 23 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujisaki et al. in view of Patel (5,396,403). Lin et al. Fujisaki et al.

disclose the invention substantially as claimed as stated above. However, Fujisaki et al. do not disclose a coupling feature to the both side of an interposer by solder bumps. Patel teaches the use of a coupling feature to the both sides of an interposer 65 by solder bumps 17 in an integrated circuit for the purpose of making a desired integrated circuit. Patel also disclose an electrical cable 89 for power connection. See Fig. 4. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the integrated circuit chips of Fujisaki et al. in view of Patel such that an a coupling feature of the interposer and solder bumps could be provided in order to make the integrated circuit in a desired manner.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fujisaki et al. in view of Patel as applied to claim 4 above and further in view of Lin et al. (6,188,578 B1). Fujisaki et al. in view of Patel disclose the invention substantially as claimed as stated above. However, Fujisaki et al. in view of Patel do not disclose an underfill material. Lin et al. teach the use of an underfill material 18 in an integrated circuit package for the purpose of serving an integrated circuit. See Fig. 1. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the integrated circuit chips of Fujisaki et al. in view of Patel and further in view of Lin et al. such that an underfill material could be provided in order to serve the integrated circuit.

### ***Response to Arguments***

Applicant's arguments, see remarks of amendment, page 8, filed 04/06/04/04, with respect to the rejection(s) of claim(s) 1-9, 12-20 and 22-29 under 35 U. S. C. 103(a)

have been fully considered and are not persuasive. The Applicant argued, "In other words, cooling takes place due to heat exchange between the coolant 15 and the pin-shaped fins 14 and the top surface of the semiconductor element 11 (col. 1, lines 39-44) (emphasis added).

Fujisaki does not teach cooling fluid to directly contact and move laterally across the active surface of claim 1 or cooling fluid is directly contact and move laterally across the active region of claim 8 or moving a cooling fluid laterally across and in direct contact with an active surface of the integrated circuit die of claim 12 or cooling fluid is to directly contact and move laterally across the active surface of Claim 17 or a cooling fluid -----directly contact and move laterally across the active region of the integrated circuit die of Claim 27. Accordingly independent claims 1, 8, 12, 17 and 27 are allowable over the teachings of Fujisaki. Claims 2-3, 6, 7, 9, 13-16, 18-20, 22-24, 26, 28 and 29 depend from independent claims 1, 8, 12, 17 and 27 and thus are allowable for at least the same reasons as pertain to claims 1, 8, 12, and 27. The Examiner disagrees. In practice when a fluid enters a closed container from one side and leaves or exits from the other side, the fluid spreads in all possible direction in side the container and moves toward the exit. Consequently fluid touches the all the objects and exchanges heat therewith in side the container before leaving the container from the other end. Therefore, Fig. 37 constructionally teaches the claimed subject matter. Moreover, Fujisaki describes for Fig. 37 and 38, "Before passing inside the sealed container 231 and reaching an outlet 236 a coolant 235 hits the partition members 220 and forms the two-dimensional jet flow on the downstream side of each partition member 220. Hence,

the semiconductor elements 11 are efficiently cooled. In other words, this first modification can utilize the high cooling efficiency of the jet flow and also increase to the limit the mounting density of the semiconductor elements 11 within the electronic equipment." Therefore, The rejection is proper. Regarding objection to the drawing the Examiner is convinced to withdraw the drawing objection for claim 25 as the specification clearly shows the objected phrase "optical to electrical interface for first integrated circuit die" (Page 5, lines 1-80. But there is no word "pump) located inside of the integrated circuit for claim 14. Therefore, the objection to claim 14 will stand.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier from the examiner should be directed to Mohammad M. Ali, whose telephone number is (703) 308-5032. The examiner can be reached from 6:10am to 2:40pm from Monday to Friday.

Art Unit: 3744

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Denise Esquivel, can be reached at (703) 308-2597. The fax number for the organization where this application or proceeding is assigned is 703-308-7764 for regular communications and after-final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0861.

  
W. E. Tapolcai  
Primary Examiner  
Art Unit 344



Ma

May 14, 2004